

## Why Upgrades Are Important – Some Lessons Learned with Older Monitoring Systems

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One of the more interesting aspects of my job is the opportunity to visit customer locations all over the world. It is not uncommon for me to see Bently Nevada instrumentation put into service twenty and even thirty years ago still being actively used today. While we are pleased that our products perform reliably for so many years (as designed), technology has changed substantially. The integrity and self-checking we can provide today is considerably better than that of our instrumentation several decades ago. I was reminded of this recently during a visit with a South American customer. I'd like to share the story with you here, because it highlights some important considerations related to machinery protection.

### Performance Problems with an Older System

During this South American visit, a plant manager expressed his concerns regarding several false shutdowns that one of our monitoring systems had generated. A visit to the compressor deck was quite enlightening. The instrumentation in question was our original 5000 Series monitoring system. It was put into service at this plant in the late 1960s. This particular model has been obsolete for over ten years. The false trips were caused by a single-channel thrust position monitor. The Proximitor® transducer feeding this monitor had a loose extension cable connector which had caused the trips. The solution to this problem was very easy: dual-voting thrust position.

### Single-Channel Thrust Position Measurements

We do not recommend the use of single-channel thrust position measurements in automatic trip installations, for reasons that are delineated in this issue's "Back-to-Basics" article, *Voting Thrust Measurements with Other Parameters*, on page 51. We have learned a lot since the early days of



5000 Series Monitoring System.

5000 Series. For example, before 1970 we did not even offer dual-voting thrust position monitors. Much of our knowledge about the importance of a dual-voting measurement occurred during the late 1960s and early 1970s when the 5000 Series monitoring system was in production. Partway into the 5000's life-cycle, we introduced an enhancement allowing customers to either purchase a dual-voting thrust monitor, or to retrofit their old single-channel thrust monitor with an upgrade kit making it a dual-voting monitor. Providing a dual-voting monitor, however, is only 50% of the solution. The other half involves installation of two redundant proximity probes observing axial thrust position. On rare occasions, it is difficult to mount more than a single axial proximity probe. In the vast majority of cases, however, two redundant probes can be mounted and the measurements can be voted in a dual-voting thrust position monitor. In those rare instances where only a single thrust probe can be installed, it is generally not recommended to be an input to an automatic shutdown system (it should be utilized for alarm only).

Dual-Voting Thrust Position has been required in all editions of American Petroleum Institute's specification API 670.

### The Role of NOT OK Circuitry

Another body of knowledge we've acquired along our journey has been how to detect, annunciate, and process vibration transducer failures. Proximity probe systems lend themselves particularly well to self-checking. This is because failures (both intermittent and non-intermittent) can often be detected by monitoring the probe "gap

voltage.” Without going into all the details, the *value* of the gap voltage and the *rate* at which gap voltage changes can be used in the monitoring systems to determine if the transducer is operating correctly. Midway through production of our 7200 Series in 1975, we introduced an enhancement to our NOT OK detection circuitry called “Timed OK / Danger Defeat” whereby the monitor channel instantly detects an out-of-OK condition and defeats the Danger function. If the gap voltage returns to normal, the channel must remain “OK” for a pre-determined length of time before its protection capabilities (i.e., Danger alarms) are enabled. Intermittent problems, in particular, can result in a signal jumping from OK to NOT OK rapidly. Our Timed OK / Danger Defeat circuitry solves this problem and is one example of how the integrity of our systems has been enhanced over the years. This feature is now standard on many Bently Nevada monitor systems. **[Editor’s note: Casing vibration measurements on reciprocating compressors can experience impulse excitations severe enough to activate the monitor’s Timed OK/Danger Defeat circuitry, possibly resulting in missed trips. In applications such as these, it may be appropriate to disable the Timed OK/Danger Defeat circuitry. Other seismic monitoring applications may likewise dictate that the Timed OK/Danger Defeat function be disabled. Contact your Bently Nevada sales or service professional for details and applications assistance.]**



7200 Monitoring System.

## Transducer Improvements

As I noted above, one of the problems found at this customer’s site was a loose connection on the Proximitor® transducer extension cable. Our newest (3300 XL) proximity probe system has made tremendous strides towards eliminating this problem entirely. All cable connections now use our patented ClickLoc™ connectors, an ingenious design that allows you to finger-tighten the connectors yet virtually guarantees they won’t vibrate loose over time. Field wiring connectors have also been improved with special spring-loaded connectors that eliminate screws

and their tendency to loosen over time. Other enhancements incorporated in our 3300 XL Series of transducers are outstanding immunity to RF (radio frequency) interference from handheld radios and the ability to meet stringent CE requirements without the need for solid conduit or special enclosures. The probes, cables, and Proximitor® sensor have all been made more environmentally robust as well. Although the basic appearance of our probes may not have changed much over the years, closer inspection reveals that they have been completely re-engineered to provide a more rugged, better performing, and trouble-free solution for our customers.

## Why It Is Necessary to Upgrade Systems

We are proud that we build instrumentation that lasts so long. Unfortunately, customers sometimes assume that just because “the green lights are on,” indicating OK conditions in their monitors, they are receiving adequate machinery protection. This may not always be the case. With 5000 Series monitors (and some 7200 Series), for example, none of the advanced self-checking circuitry to detect monitor failures is present. Even when these systems are operating at 100% of their design capability, they cannot compare with the system integrity of our current products.

In addition, many of these older systems cannot be supported because of a lack of part availability. When we can no longer adequately support a monitoring system, or technology has progressed such that yesterday’s systems are no longer adequate for the demands of our customers, we embark upon a planned phase-out of the product. The 5000, 7200, and 9000 Series monitoring systems fall into this category. For more information on the topic of product life-cycles, please refer to *Why We Must Discontinue Some Products*, in the Second Quarter 1999 issue of ORBIT, Volume 20 Number 2, pp. 5-7.

## Conclusion

I encouraged this customer to do the same thing we recommend to all customers with older systems: upgrade to current generation systems. The economic consequences of a single missed trip or false trip greatly exceed the cost of a monitoring system upgrade. We know this, and it’s why we invest so much in making the most reliable instrumentation possible. If you have older Bently instrumentation installed, particularly systems prior to our 3300, an excellent idea would be to have your local Bently Nevada sales or service professional help you conduct an audit of your installed systems. They can identify any systems in need of repair or upgrade, and help ensure that you are receiving the level of machinery protection integrity consistent with your needs today and for years to come. ☺